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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BAYOU, AMENE SETEGNE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/822,699	Applicant(s) KIM, NAM-SU	
	Examiner AMENE S. BAYOU	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-8,10 and 16-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,10 and 16-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/02/2007,02/01/2007,04/13/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al. (U.S. Patent 4,804,913).

Regarding claim 1:

Shimizu et al. '913 disclose a piston-cylinder device having a magnetic-ring/core (item 21b in Fig. 4) on one end of a piston (item 21e in Fig. 4), a detection-head/bobbin (item 20 in Fig. 4) housing a first and second coil (items A1 and C1 in Fig. 4), and the magnetic-ring/core has a length in an axial direction shorter than half the length in the axial direction of the first and second coils arranged end-to-end, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thus encompassing each coil slightly longer than the magnetic-ring/core. Furthermore, it is noted that one of the rings is enough to constitute a "core" and therefore, the combined coil is quite clearly longer than the core. Also, it has not

been described in the written description how to find the length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil. When the coils are slightly larger than the core, it meets this limitation.

Regarding claim 3:

Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance if the time that the core takes to exit and enter the bobbin increases over a predetermined time. This is achieved because of the fact that the controller has features for velocity detection (24) and also acceleration detection (25).

3. Claims 16-21 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al. (U.S. Patent 4,804,913).

Regarding claims 16:

Shimizu et al. '913 disclose a piston-cylinder device having a detection-head/bobbin (item 20 in Fig. 4) defining an aperture with first and second coils therein (items A1 and C1 in Fig. 4), a magnetic-ring/core (item 21b in Fig. 4) attached to a piston (item 21e in Fig. 4) and disposed coaxially in the aperture, and the length of magnetic-ring/core in an axial direction shorter than half the combined length of the first and second coils in axial direction, since Shimizu et al. '913 state the length of each coil

is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the magnetic-ring/core. Furthermore, it is noted that one of the rings is enough to constitute a "core" and therefore, the combined coil is quite clearly longer than the core. Also, it has not been described in the written description how to find length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil. When the coils are slightly larger than the core, it meets this limitation.

Regarding claims 17-20:

Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance if the time that the core takes to exit and enter the bobbin increases over a predetermined time. This is achieved because of the fact that the controller has features for velocity detection (24) and also acceleration detection (25). Schwarz et al. '379 teach decreasing-piston-stroke/increasing-top-clearance if time to is longer than desired or based on elapsed time (i.e. as required by the cooling load or as required to avoid piston collision, 8:2-5) . Shimizu et al. '913 disclose a sensor coil having a first and second coil (items A1 and C1 in Fig. 4).

Regarding claim 21:

Shimizu et al. '379 teach the length of each coil to be substantially equal to the length of the magnetic-ring/core, and hence to each other (6:10-11). Furthermore, it is noted that one of the rings is enough to constitute a "core" and therefore, the combined coil is quite clearly longer than the core. Also, it has not been described in the written description how to find length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil. When the coils are slightly larger than the core, it meets this limitation. Shimizu et al. '379 teach by implication the coils to have equal inductances to enable the phase-shifting method. Shimizu et al. '379 teach the coils to have the same number of turns by implication since, as a practical matter, coils of equal length and inductance have the same number of turns.

Regarding claim 25:

Shimizu et al. '379 teach the first and second coils each comprise a single coil, in column 7, lines 60-63

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (U.S. Patent 4,804,913) in view of Mukai et al. (JP 2000111307). Shimizu '913 teaches the basic claimed apparatus as set forth above.

Regarding claims 4-7:

Shimizu et al. '913 disclose a piston-cylinder device having a magnetic-ring/core (item 21b in Fig. 4) on one end of a piston (item 21e in Fig. 4), a detection-head/bobbin (item 20 in Fig. 4) housing a first and second coil (items A1 and C1 in Fig. 4), and the magnetic-ring/core shorter than half the length of the first and second coils arranged end-to-end, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thus encompassing each coil slightly longer than the magnetic-ring/core. Furthermore, it is noted that one of the rings is enough to constitute a "core" and therefore, the combined coil is quite clearly longer than the core. Also, it has not been described in the written description how to find the length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same

length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil.

When the coils are slightly larger than the core, it meets this limitation. Shimizu et al.

'913 disclose a controller (Fig. 5) capable of controlling piston position and top clearance.

Shimizu et al. '913 does not teach the coils in branches. Mukai et al. '307 teach first and second branches comprising first and second coils (L1 and L2 in Fig. 1(b)) in series with first and second resistors (R1 and R2 in Fig. 1(b)), a power source (item 5 in Fig. 1(b)) applied to the branches, and voltages applied from the resistors and coils (VD in Fig. 1(b), 2(a), and 2(b)) to a comparator (item 8 in Fig. 3) capable of zero output.

Shimizu et al. '913 and Mukai et al. '307 are analogous art because they are concerned with the similar technical difficulty of detecting displacement. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have provided the branches and comparator taught by Mukai et al. '307 in the piston-cylinder device of Shimizu et al. '913. The motivation would have that Mukai et al. '307 suggest that the branches and comparator are an equivalent and alternative form for a position detecting circuit.

6. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz et al. (VVO 01/48379) in view of Shimizu et al. (US Patent 4,804,913).

Regarding claim 8:

Schwarz et al. '379 teach a compressor control method (4:5) comprising measuring a time to a reciprocating piston travels beyond a position R (5:29-33), and

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controlling a piston position based on to by setting voltage of the motor driving the piston (6:3-4). Schwarz et al. '379 do not teach detecting piston position using a core and first and second coils in a bobbin. Shimizu et al. '913 teach detecting a position using a magnetic-ring/core (item 21b in Fig. 4) combined to one end of a piston (item 21e in Fig. 4), a detection-head/bobbin (item 20 in Fig. 4) having first and second coils (items A1 and C1 in Fig. 4), and the magnetic-ring/core in an axial direction shorter than half the length in the axial direction of the first and second coils combined, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the magnetic-ring/core. Furthermore, it is noted that one of the rings is enough to constitute a "core" and therefore, the combined coil is quite clearly longer than the core. Also, it has not been described in the written description how to find the length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil. When the coils are slightly larger than the core, it meets this limitation. Schwarz et al. '379 and Shimizu et al. '913 are analogous art because they are concerned with the similar technical difficulty of position detection. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used the core, coil, and bobbin construction taught by Shimizu et al. '913 in the method of Schwarz et al. '379. The motivation would have

been that Shimizu suggests that a core, coil, bobbin arrangement is an equivalent and alternative method of detecting position.

Regarding claim 10:

Schwarz et al. '379 teach decreasing-piston-stroke/increasing-top-clearance if time to is longer than desired (i.e. as required by the cooling load or as required to avoid piston collision, 8:2-5)

7. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. (U.S. Patent 4,804,913) in view of Mukai et al. (JP 2000111307). Shimizu et al. '913 teach the basic claimed apparatus as set forth above.

Regarding claims 22-24:

Shimizu et al. '913 disclose a piston-cylinder device having a detection-head/bobbin (item 20 in Fig. 4) defining an aperture with first and second coils therein (items A1 and C1 in Fig. 4), a magnetic-ring/core (item 21b in Fig. 4) attached to a piston (item 21e in Fig. 4) and disposed coaxially in the aperture, and the magnetic-ring/core shorter than half the combined length of the first and second coils, since Shimizu et al. '913 state the length of each coil is substantially equal to the length of the magnetic-ring/core (6:10-11), thereby allowing each coil to be slightly longer than the magnetic-ring/core. Shimizu et al. '913 disclose a controller (Fig. 5) capable of controlling piston position. Shimizu et al. '379 teach the length of each coil to be substantially equal to the length of the magnetic-ring/core, and hence to each other (6:10-11). Furthermore, it is noted that one of the rings is enough to constitute a "core"

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and therefore, the combined coil is quite clearly longer than the core. Also, it has not been described in the written description how to find the length of each piece. For example, the coil's length might readily be perceived as the actual length of the spun coil thereby easily meeting the claim. Furthermore, Shimizu states the length of each coil is substantially equal to the length of each magnetic ring/coil, which means that the coils can have exactly the same length, a slightly larger length, or a slightly smaller length as the magnetic ring/coil. When the coils are slightly larger than the core, it meets this limitation. Shimizu et al. '379 teach by implication the coils to have equal inductances to enable the phase-shifting method. Shimizu et al. '379 teach the coils to have the same number of turns by implication since, as a practical matter; coils of equal length and inductance have the same number of turns.

Shimizu et al. '913 do not teach the coils in branches, comparator, or DSP. Mukai et al. '307 teach first and second branches comprising first and second coils (L1 and L2 in Fig. 1 (b)) in series with first and second resistors (R1 and R2 in Fig. 1 (b)). Mukai et al. '307 teach a comparator and DSP (item 8 in Fig. 3) receiving voltages (VS1 and VS2 in Fig. 1 (b)) from each branch and outputting a voltage (VD in Fig. 1 (b), 2(a), and 2(b)) capable of being zero. Shimizu et al. '913 and Mukai et al. '307 are analogous art because they are concerned with the similar technical difficulty of detecting displacement. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have provided the branches, comparator, and DSP as taught by Mukai et al. '307 in the piston-cylinder device of Shimizu et al. '913. The motivation would have been to sense piston position.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al.'913.

Regarding claims 25:

Shimizu et al.'913 REF A discloses the claimed invention except for mentioning that the sensor coils each comprise a single coil. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the coils single instead of separate, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1993).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amene S. Bayou whose telephone number is 571-270-3214. The examiner can normally be reached on Monday-Thursday, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you

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have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746